ICT and Multimedia Educational Environments in the K-Economy for Malaysia

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1. Introduction

Educational institutions globally are going to change dramatically in the next century. Due to the integrated technological and social forces, so as the globalization, the extension of time and place, the disembedment of social relations and the reflecting structuring of knowledge, the structural premises for educational practices and the product these institutions hope to produce will also have to change. On one level, these changes may lead to the disembedment of the process of learning and teaching and an increasing competition between educational institutions. Perhaps the scare scenario is that education becomes an abstract relation to the Internet or just-in-time educational packages for self-instruction. Small, locally situated physical institutions may disappear and be replaced by a few very big and prestigious world universities through on-line education. Yet on an exciting note, the technological changes also hold many educational possibilities. In today's information era or knowledge-economy, the citizens need to be knowledgeable than ever before, they need to equip themselves with knowledge in order to achieve their goals. They also need to be a skilled knowledge worker in the Computer-Mediated Communication (CMC) or Multimedia - Mediated Communication (MMC) or Information Technology Communication educational environments.

2. Defining Knowledge

Due to the fact that for most times words like data, information and knowledge are often used loosely to describe the same phenomena, it is important to begin a clear picture of what knowledge means for this purpose. For the purpose of this paper, data are defined as any signals which can be sent from the originator to a recipient-human or otherwise. Information is defined as data which are intelligible to the recipient. Finally, knowledge is defined as the cumulative stock of information and skills derived from use of information by the recipient. Where the recipient is a human being, knowledge thus reflects the processing (thinking or cognition) by the brain of the raw material supplied in the form of information. All these can be observed in Figure 1.

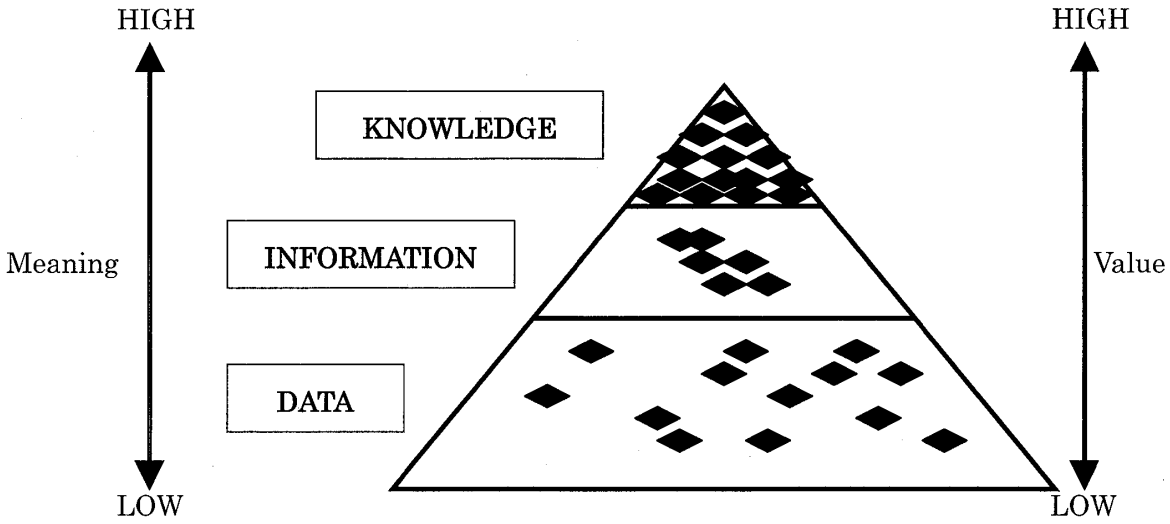

Figure1: Data, Information and Knowledge

It can be seen from the above that knowledge subsumes information, which represents both the input to knowledge development and the form in which knowledge is transferred –its 'circulatory system'. The traditional economic view of information and knowledge is that they are the same thing. In practice, it can be seen that they are different but strongly complementary (Chisholm, 1989).

Perhaps a useful distinction can be made between knowledge about something and knowledge about how to do something ('know-how'). Knowledge about something generally relates to concepts and theories, and know-how to the acquisition of skills through practical implementation of such concepts and theories. Learning on the job in a work situation is a classic example of acquiring knowledge or skills through practice or what is sometimes termed as 'learning by doing'.

Knowledge can be further classified according to whether they can be made explicit or whether it remains implicit or tacit. The critical difference between these two aspects of knowledge relates to how easy or difficult it is to codify or express the knowledge in terms which enable it to be understood by a broad audience. If knowledge can be codified in this way, then it can be made explicit and readily transferable. Subsequently, if it cannot be made explicit, it must remain tacit (literally, 'silent'), thus difficult if not impossible to transfer-as Michael Polanyi says in his seminal work: 'The Tacit Dimension"- 'we know more than we can tell'.

3. Defining Information Era or the Knowledge-Economy

To define the information era or the knowledge economy, one has to study the socio-economic impacts of information technology on the nation's society and the economy. First, the new CNTs and ICTs has an impact on amplification of information: i.e. it allows more information / knowledge to be stored, accessed and disseminated more quickly than previously was possible. It is an energy amplifier-whether one is referring to computer aided design, flexible manufacturing processes, image enhancement systems or word processing. Real reductions in labour-related costs can be attributed to information technology investments in a wide range of functional activities. In commercial terms, this raises output, improves quality control, allows for customized manufacturing/services provision and gives high technology companies competitive edge over their more manually based market competitors. In the information business/information industry, the availability of electronic databases linked via global telecommunications networks and gateways has increasingly marginalised traditional print-based repositories of information.

Figure 2 shows in conceptualized form the information era or knowledge economy. The first element in the k-economy is knowledge itself - as is defined earlier, where knowledge has become an important resource in the development of an industry or organization or a nation. In comparison to physical resources like petroleum, natural resources and financial resources-knowledge today has risen above all physical resources in terms of its importance (Hartman 2000).

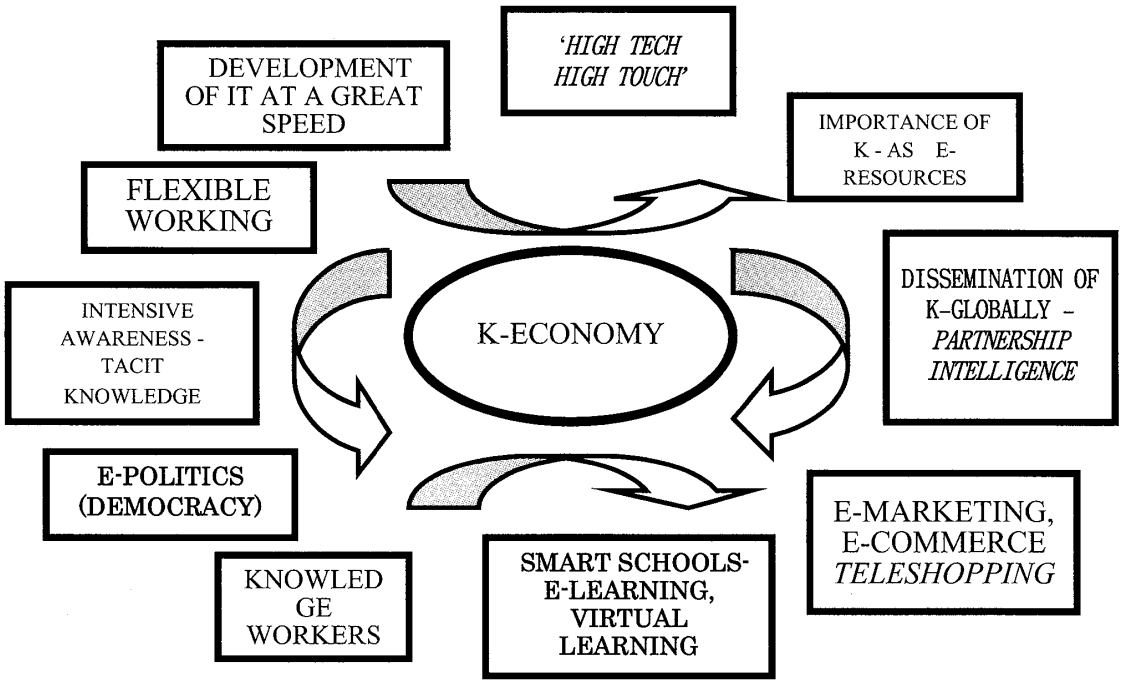

Figure 2: Conceptual Model of the Knowledge Economy

Industries, organizations or nations that has acquired knowledge resources are considered successful, powerful, rich and influential industries, organizations or nations. The said knowledge has been acquired globally through various communications technologies that exist, like the Internet. The knowledge acquired is not just limited to the thoughts of a particular society only but from various societies throughout the world. The knowledge acquired is not limited to one domain of knowledge or field but an integration of various knowledge not just in the form of text, but also other media such as graphics, audio, video, animation, numeric and the like.

The second element is dissemination of information/knowledge globally: this element is closely related with the first element. Information/knowledge acquired is not stored for individual/single organizational use but to be shared collaboratively through some strategic alliance or smart partnership or what Dent (2000) called 'partnership intelligence' arrangement through the Internet. The information/knowledge to be shared can be in the form of text, video, audio, hypertext, hypermedia or multimedia.

The third element is change in the way business and trade is conducted-through the emergence of e-commerce, e-marketing and teleshopping. The Internet as well as the tools within it such as : e-mail and the world wide web (wwww) through the homepages created by organizations has made it possible by industries to not only advertise new market driven products, but also enable industries to run their businesses as well as trading interactively successfully. Industries have a better edge with their competitors and conducting businesses this way in the long run saves cost.

In this knowledge economy the stress on the fourth element is e-education or smart schools. E-learning and virtual learning is becoming a more practical solution as education expands and becomes a life long learning process. The society need not attend formal classes but can acquire learning while in the work place or at home at their own pace. The ICT like the Internet has made it possible for more of to population to acquire degrees that would not have been possible in the conventional way. Knowledge is transmitted and disseminated virtually by various institutions of higher learning throughout the world to enable those interested to do continuos learning, but do not have a chance through the normal channel. Potential learners can register virtually and can attend lectures without going to the conventional lecture theatres.

The fifth element is the creation of knowledge workers ; this element stresses on the importance of workers with a new culture and mindsets; workers who not only possess skills, can use the technology (IT), but also workers that can make decisions using thinking

skills and methodologies such as logical, analytical, rationality and problem solving techniques based on knowledge that has been researched.

The sixth element is e-politics or telepolitics: ICTs like the Internet can make society more knowledgeable on politics generally and on democracy particularly, and this makes them more aware of their role in politics as knowledgeable citizens. The electorates can communicate with their respective member of parliaments through e-mail or specific web sites in the Internet. Consequently, the politicians can interact with their supporters or constituencies with greater speed in real time through e-mail, www or teleconferencing.

The seventh element is the intensive awareness of the need for tacit knowledge: the need for organizations to move from managing information to managing knowledge. This means that organizations have the challenge to develop a culture that facilitates not only exchange of (manageable) explicit knowledge but also renewal of (less manageable) tacit knowledge (example practices that have proved successful by project champions). This can be done through case-based systems, which can provide a richer array of information (contextual information). This element also stresses on the need for research in order to create inventions that are innovative and practical.

The eighth element is the fast development of IT : This has made it possible for users to improve their communication process between individuals, industries and nations all over the world. This has made it possible for employees to work flexible hours and from home instead of the workplace.

The last element is what Naisbitt (2000), termed as'High Tech, High Touch'. Advancement of the ICTs like the Internet, does not mean that one should concentrate on the technology alone, one should also consider the values that goes with the technological advancement in order to have the best both here and the life hereafter. This means that the technological advancement and inventions should take into consideration good values so that the society can use them in the best positive way and as ibadah.

4. Information and Communication Technologies (ict) in the K-Economy Era

The 1990s has shown tremendous progress in terms of how computers and Information Technology is used in information storage, access, dissemination and communication. The CNTs and ICTs have introduced a concept that changes the nature space. They have created a cyberspace where multiple and diverse opportunities for social, intellectual, business and educational interaction can evolve from the local to the planetary level. The

networking communication technologies have made it possible for broadening participation for diverse groups and enabling the society to participate and build new partnerships. They have introduced an electronic virtual community where millions can come to share information/knowledge, and ideas as well as organize and mobilize for action on an unprecedented scale. This interaction can occur at a speed previously unheard of.

Burch (1995) said that' the logic of networks is essentially a logic of spaces. Cyberspace itself is comprised of a year conglomeration of data and information flow within which it is possible to define specific spaces where common interest groups gather to exchange information or knowledge or coordinate activities'. Studies have shown that participating in these spaces meant that individuals and organizations are developing their experience, skills, confidence and self-esteem to participate in other online circles and to publicly express their viewpoints. This is what empowering knowledge/education is all about. Access through such interactive space of communication can provide women opportunities to empower themselves through intellectual discourse with a propositional focus, going beyond the rhetoric of denunciation and complaint. Moreover, the new educational opportunities offered by theCMCs/MMCs/ ICTs can be a training ground to develop the means of expression in the new media practices that will develop through this technology and in other media in this knowledge economy era.
One of the most used CMCs /ICTs today is the Internet. The internet or the super highway is basically a collection of computers which can be accessed publicly through individual computers that are linked by networking. There are basically two components involved in the Internet: first, the computer; second, man.

First component: Computer: millions of computers are linked 24 hours a day, 7 days a week. Each computer can be accessed using Internet ID, and each computer prepares specific information or knowledge or service.

Second component : Man: millions of people all over the world at a particular time (irrespective whether day or night) is on the net either due to their work, making decisions, communicating with competitors, communicating with clients, communicating with business partners, sending e-mails, discussing or just exploring thousands of other computers and knowledge available throughout the world.

When the Internet really went public in 1995 (Wayne 1998), it was estimated that there are more than 250,000 separate destinations. It was estimated that the number will increase by more than 6,000 destinations every month. In 1999 it was expected that the Internet will have more than 50 million users throughout the world and this number is estimated

to increase up to 300 million by the year 2001 (Hoffman & Novak 1995). The world wide web (www) is anticipated to be the segment that will develop and expand very fast with estimated 3,000percent increase per year.

5. Creation of the Knowledge Worker (*K-INSAN*)

In order to ensure that the new educational system with its new approach and strategy shall produce the knowledge worker as deemed by the nation, the characteristics of the knowlege worker known as the k-Insan (Tengku Mohd. et.al 2001) was created as follows:

- **Knowledge and Skills**
  - Possess a sound formal education.
  - Learned the skills of how to learn.
  - Possess the habit of attaining lifelong learning.
  - Possess knowledge and skills in the fields learned.
  - Ability to work in groups.
  - Possess moral, religious and social values.
  - Possess thingking skills : problem solving skillss, creative skills and Analyzing and senthesizing skills.
  - Possess critical thinking: understand fundamental theories; make critical judgements, and possess techniques of determining and solving problems.
  - Possess nonlinear thinking and working processes.
  - Ability to produce quality work outcomes in the form of problems that can be solved;ideas on new products;and new strategies on incremental and quantom leaps.
  - Ready to share results of work with colleagues, although work is incomplete or work is wrong so that the work can be seen, discussed and criticized.
  - Ability to understand systems thinking in terms of: physical and meta physical, abstract and concrete, theory and practical, individual and society as well as ideology and religion.
  - Ability to use tools, hardware and technology to help in the tasks assigned.

- **Professionalism**
  - Possess management and implementation skills in order to produce quality work in terms of cost and time.
  - Ability to make a wise decision based on knowledge and values.
  - Possess a basic understanding of the legal aspects.
  - Possess management ability not just based on mental intelligence (IQ) but also on

Emotional Intelligence (EQ) in order to manage people.

- **Entrepreneurship**
  - Possess entreprenial skills in commercializing products (innovation, discovery,and development) in order to create wealth.
  - Ability to disseminate work products to a larger group of the society.
  - Ability to compete in terms of generating ideas and professionalism in creating programme frameworks and discipline in achieving success.
  - Ability to understand the philosophy and laws pertaining to copyright and intellectual property.
  - Ability to understand basic philosophy, principles and business as well as marketing mkodels.

- **Socialization**
  - Ability to work in collaboration and cooperatively in groups.
  - Possess social interactive skills (discussion, meetings, critics, making telephone calls, e-mail and chatting etc).
  - Ability to understand and respect the importance of culture and values within the organization and society.

- **Values and Internalization**
  - Ability to understand and internalize moral values, ethics, culture, and religion within the organization and society.
  - Possess a sound philosophy and principles of life.
  - Possess sincerity and honesty.
  - Possess the intention of dissemination goodness to the universe (*extensionalism*).
  - Possess a strong spiritual ability to face trials and tribulations.

Figure 1 shows the conceptual model of the *k-Insan* based on the characteristics discussed.

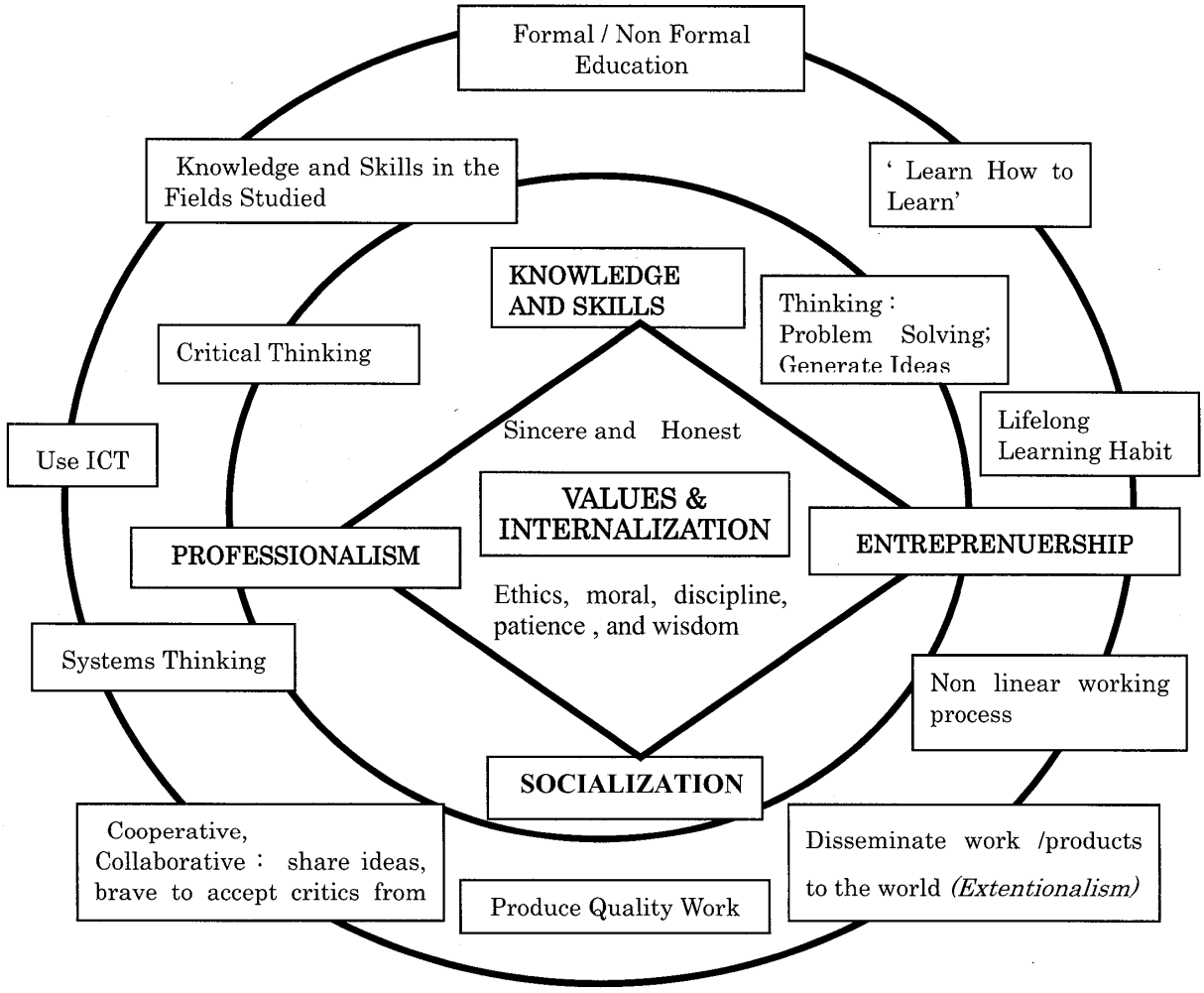

Figure 1: Conceptual Framework of K-Insan

6. Present Electronic Educational Environments in Malaysis

Malaysia aspires to be a developed nation by the year 2020. In this global knowledge or k-Economy however, she faces tremendous challenges. In this k-economy there is need for changes; change form an economy that was dependent on physical capital to an economy dependent on knowledge capital. This is to ensure that the national products are competitive in the global market. The k-economy has implications on Education as follows:

i) With globalization (Open economy), Malaysia is open to various negative efforts such as whit collar crimes and various other technological crimes. Education can thus provide the foundation to create a unique Malaysian population.

ii) Global community poses to be complex. Citizens of the nation need to robust, committed and knowledgeable in order to have the competitive edge. This responsibility lies with education.

iii) Development of ICT and Globalization provides various opportunities for the use of ICT in educational environments.

Malaysia have begun introducing the use of electronic technology in the educational environment though not all educational institutions are electronically linked. The pilot project on smart schools conducted in 85 secondary schools and 5 primary schools are ongoing presently. When the other 8,000 secondary schools will experience an electronic environment is yet to be seen. The educational departments each have their own isolated ICT programs and each of these initiatives are sometimes not known by the other departments. Plans have to made to integrate these initiatives so that the country can truly benefit form these efforts.

Table 1 shows statistics on the ICT initiatives in the various departments of the Ministry of Education in Malaysia from the last two phases : Phase 1 1985-95 and Phase 2 1996-2001 (Tengku Mohd et al. 2001). As can be observed from the Table, the ICT initiatives are more concentrated in the second phase i.e. between the years 1996-2001. There is an 81% increase in ICT initiatives in the second phase. As can be observed from the table too, every department has their own individual initiatives. There must be a policy or a vehicle that can integrate all these initiatives.

Table 1: ICT Initiatives in the Ministry of Education (MOE) from 1985-2001

DEPARTMENTS	PHASE 1: 1985-95	PHASE 2: 1996- 01	TOTAL
TEXT BOOKS	-	1	1
SCHOOL	-	2	2
INST AMINUDDIN BAKI	7 + 8*	4 + 16*	11+24*
HIGHER EDUCATION	-	3	3
DEVELOPMENT & SERVICES	-	1	1
MORAL & ISLAMIC EDUCATION	-	2	2
TECHNICAL EDUCATION	1	6	7
EXAMINATION SYNDICATE	-	1	1
CURRICULUM DEVELOPMENT CENTRE	1	12	13
FINANCE	-	3	3
POLICY & CORPORATE MGT	-	2	2
EXAMINATIONS COUNCIL	-	6	6
PRIVATE EDUCATION	-	12	12
SPECIAL EDUCATION	-	5	5
PLANNING AND RESEARCH ON EDUCATION POLICY	2	3	5
HUMAN RESOURCE & SERVICES	7	11	18
SCHOOL INSPECTION	-	1	1
SCHOLARSHIPS	-	3	3
INFORMATION SYSTEMS	1	16	17
INFORMATION TECHNOLOGY	-	5	5
TEACHER EDUCATION	-	6	6
TOTAL	27	121	148

Table 2: Current Status ICT Management and Administration Applications in MOE

Department	Administration	Finance	Operation	R&D	Marketing	HR
BBT	-	-	-	-	-	-
BS	-	-	-	-	-	-
IAB	11 X	-	1	-	-	-
JPT	1	1	1	-	-	-
BPP &B	-	-	1	-	-	-
JPIM	-	-	-	-	1 X	3 XX
JPT	-	-	2	4	-	-
MPM	-	-	-	-	-	-
PPK	-	2	1	1	1	-
BK	-	3	-	-	-	-
BDPK	-	-	-	1	1 X	-
LP	-	-	6 XXX	-	-	-
JPS	2	2 X	4 X	-	3 XX	-
JPK	-	-	2 X	-	-	-
BPPDP	-	-	2 XX	-	-	-
BP&P	1	5	2 XX	-	-	10 XXX
JNS	-	1 X	1	-	-	-
BB	-	2 X	1 X	-	1 X	3
BSM	-	1	9 X	-	-	1 X
BTP	-	-	3	-	1 X	-
BPG	-	-	-	1	1 X	-
IPTA	11 *	22 *	44 *	11 *	11 *	11 *
TOTAL Number Overlapping	18 (1)	23 (3)	48 (11)	10	12 (7)	20 (6)

Table 2 shows the current status of ICT applications in the various departments of the Ministry of Education. As can be observed from the table, there are various overlapping applications (marked X) in areas of administration, finance, operations, Marketing and Human Resource. The only area that does not have any overlapping applications is Research and Development.

Table 3: Current Status ICT Teaching and Learning Applications in MOE

Department	Curriculum	Pedagogy	Operation	R&D	Training	TLM
BBT	-	-	-	-	-	1
BS	1	-	-	-	-	-
IAB	25	-	-	-	-	-
JPT	-	-	-	-	-	-
BPP &B	-	-	-	-	-	-
JPIM	-	-	1	-	-	-
JPT	-	-	-	-	-	-
MPM	-	-	-	-	1	-
PPK	2	1 X	7 X	5	-	-
BK	-	-	-	-	-	-
BDPK	-	-	-	1	1 X	-
LP	-	1	2	-	-	-
JPS	-	-	-	-	-	-
JPK	1	-	3 XX	-	-	1
BPPDP	-	-	3X	-	-	-
BP&P	-	-	-	-	-	-
JNS	-	-	-	-	-	-
BB	-	-	-	-	-	-
BSM	-	-	-	-	-	-
BTP	-	2	2	1	-	4
BPG	3	1 X	-	1	2	-
IPTA*	36 *	11 *	1(Data NA)*	20 *	30 *	(Data NA) *
TOTAL Number Overlapping	44	8 (2)	19 (5)	26	33	6

Table 3 shows the current status of ICT Teaching and Learning (T&L) applications in the various departments of the Ministry of Education. As can be observed from the table, there are various overlapping applications (marked X) in areas of pedagogy and operations. The areas that does not have any overlapping teaching and learning applications is in curriculum, Research and Development, Training and Teaching and Learning Materials (TLM).

Figure 2 shows the e-Educational component and entity.

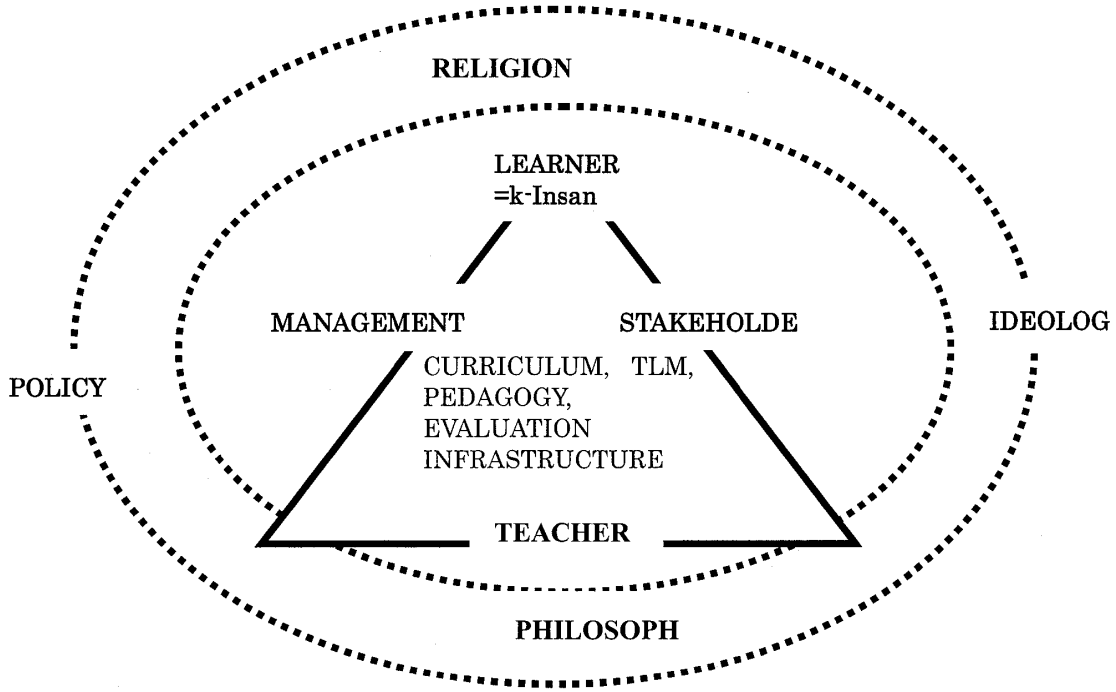

Figure 2: Concept of e-Educational Environment Component and Entity

7. Challenges of e-Eeucational Environments in Malaysla

Malaysia is presently facing various challenges in the process of adopting e-educational environments in the k-Economy era. Among these challenges are as follows:

i) Creation of knowledge workers. There is a need to create k- workers from the new educational system. Since Malaysia wants to produce a unique Malaysian citizen through its education system, the creation of the *k-Insan* was introduced (Tengku Mohd. et. al 2001)

ii) Creation of a policy on the use of ICT in education particularly in two areas: Management and Teaching and Learning. There has to be a policy for the country on the use of ICT in education both in the management aspect as well as the teaching and learning aspect.

iii) Access to ICT and multimedia infrastructure. Accessibility to computers and interconnectivity to the Internet is important to have a truly effective electronic educational environment.

iv) Creation of a dynamic curriculum. With the new electronic system of education and the need to create a new citizen = *k-Insan*; the knowledge worker based on the need of the country, a new curriculum that can meet the

characteristics mentioned earlier will have to be adhered to.

v) Training on the use of ICT and multimedia. Apart from students, teachers too need to be trained on the use of the hardware and software and also on how to be facilitators to students.

vi) Integration of all IT and multimedia applications in the education system. There is a need to make it possible for the available systems or applications to able 'to speak to one another'.

8. Plausible Implementation Strtegies

The plausible implementation strategies that can be undertaken are as follows:

i) Develop an integrated ICT and Multimedia Strategy Implementation Model.

ii) Develop a nervous system for education in the country with latest technology. These technologies should encompass:
   a) Hardware
   b) Software
   c) Network
   d) Technical methodology
   e) Management methodology
   f) Pedagogy

iii) There should be an organizational structure at the department and central level. These structure could encompass:
   a) National e-Education Committee
   b) Steering Committee on e-Education
   c) Technical Committee.

Figure 3 shows the Integrated e-Education System Model

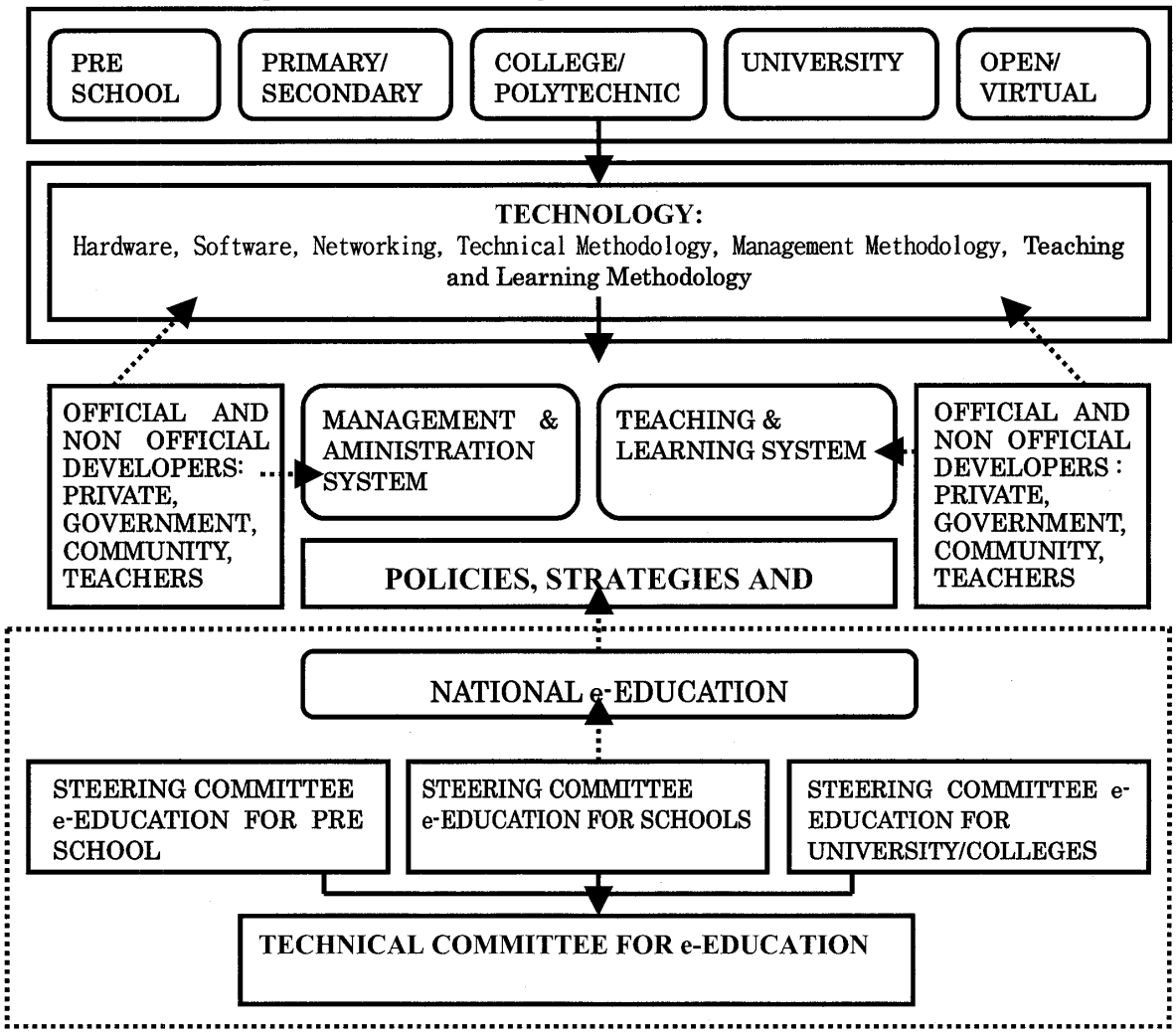

Figure 3: Integrated e-Education System Model

9. Conclusion

The information era and the knowledge economy era is here to stay and along with it is the advancement of Information and Communications Technologies (ICTs) and Multimedia. The technologies will continue to improve further and nations have to grow with the advancement or they will be left behind. The indicators of the knowledge economy has shown how knowledge has become the most important resource in the present economy. The nation needs human resources who are not just skilled but are also knowledgeable in the various fields and profession they are in. There is the need to acquire not just explicit knowledge but if possible to acquire also the tacit knowledge.

Malaysia hopes to develop its own new citizens with the characteristics of the *k-Insan*. The ICTs and Multimedia technology has made many possibilities for e-educational environments. According to Frammingan (1999), a Massachusettes-based International

Data Corporation stated that 'online learning (CMC, VL and the like) market is currently generating US$600 million in annual receipts and will exceed US$ 10 billion by the year 2002. Almost half of the academic institutions in America is currently offering online learning (CMC, MMC or VL) as part of their curriculum delivery methods. A recent IDC market research report (2001) predicts that 85% of these educational institutions will have some form of online learning (CMC,MMC or VL) in place by the year 2002.

Malaysia still has a long and hard way ahead but the early initiatives with the creation of the Multimedia Super Corridor (MSC), the smart school project and other ICT and multimedia applicaton projects that is currently taking place within the Ministry of Education of Malaysia (MOE), the scenario seems promising. This paper has also highlighted the plausible implementation strategies that could be taken by the Malaysian Government in order to create a fully electronic educational environment for Malaysia in the near future.

References

Mc Cluskey, A. (2000). *Writing-A way to Knowledge and Empowerment. Alan @connected.org*

Dent, S.M. (1999). *Partnering Intelligence: Creating Value for Your Business by Building Strong Alliances.* California: Davies-Black Publishing.

Ekelin, A. (2000). *Networking for Women. E-News, Alan @ connected.org*

Frammingan . (1999). *Online Learning* . Masschusettes : IDC.

Hartman, A. Sifonis, J and Kador J. (2000). *Net Ready : Strategies for Success in the Economy.* New York: Mc Graw Hill.

Hoffman, D.L. & Novak, T.P. (1995). *Internet Use in the U.S. 1995. Baseline Estimates : preliminary market segments.* Nashville: Vanderbilt University.

Halimah Badioze Zaman. (1998). Women and Information Technology in the Information Era. *Technical Report*: FTSM/Mei 1998/LT 45.

International Data Corporation. (2001). *Online Learning market survey.* Massachusettes: IDC.

Postma, P. (1998). *The New Marketing Era.* New York: Mc Graw Hill.

Tappscott, A. (1996). *Digital Economy: Promise and Peril in the Age of the Networked Intelligence.* London: McGraw-Hill.

Tengku Mohd Tengku Sembok, Halimah Badioze Zaman, Mohamed Yusoff, Abdul Razak Hamdan. (2001). *Policy on ICT and Education.* (Unpublished, written for the Ministry of Education, Malaysia).

Wayne, A. (1996). *Internet Business Primer.* Naperville: Sourcebooks.